

## 5 Claims:

1. A recombinant plant cell or part thereof containing a DNA molecule comprising a sequence encoding a PAP II protein.
2. The recombinant plant cell or part thereof of claim 1, wherein said plant cell part is a protoplast.
- 10 3. The recombinant plant cell of claim 1 wherein said sequence is SEQ ID NO:3.
4. The recombinant plant cell of claim 1 wherein said sequence encodes PAP II (1-285).
5. The recombinant plant cell of claim 1 wherein said sequence encodes a  
15 mutant PAP II protein that has intact catalytic active site amino acid residue (E172) and exhibits anti-viral and/or anti-fungal activity.
6. The recombinant plant cell of claim 5 wherein said sequence encodes a PAP II protein which is PAP II (1-285, G72D).
7. The recombinant plant cell of claim 5 wherein said sequence encodes a  
20 PAP II protein which is PAP II (1-285, L254R)
8. The recombinant plant cell of claim 5 wherein said sequence encodes a PAP II protein which is PAP II (1-285, L254A).
9. The recombinant plant cell of claim 5 wherein said sequence encodes a PAP II protein which is PAP II (1-237).
- 25 10. The recombinant plant cell of claim 5 wherein said sequence encodes a PAP II protein which is PAP II (1-259).
11. The recombinant plant cell of claim 5 wherein said sequence encodes a PAP II protein selected from the group consisting of PAP II (1-237), PAP II (1-238), PAP II (1-239), PAP II (1-240), PAP II (1-241), PAP II (1-242), PAP II (1-243), PAP II (1-244), PAP II (1-245), PAP II (1-246), PAP II (1-247), PAP II (1-248), PAP II (1-249), PAP II (1-250), PAP II (1-251), PAP II (1-252), PAP II (1-253), PAP II (1-254), PAP II (1-255), PAP II (1-256), PAP II (1-257), PAP II (1-258) and PAP II (1-259).
12. A transgenic plant produced from the protoplast of claim 2.
13. A transgenic plant or part thereof comprising a DNA molecule encoding a  
35 PAP II protein that upon expression exhibits anti-viral and/or anti-fungal activity.

- 5                   14.    The transgenic plant of claim 13 which is a monocot plant.
15.    The transgenic plant of claim 14 wherein said monocot plant is a cereal  
crop plant.
16.    The transgenic plant of claim 13 which is a dicot plant.
17.    Seed from the transgenic plant of claim 13.
- 10               18.    A DNA molecule comprising a sequence encoding a PAP II protein that  
has intact catalytic active site amino acid residue (E172) and exhibits anti-viral and/or anti-  
fungal activity.
19.    The DNA molecule of claim 18 wherein said sequence encodes a PAP II  
protein which is PAP II (1-285, G72D).
- 15               20.    The DNA molecule of claim 18 wherein said sequence encodes a PAP II  
protein which is PAP II (1-285, L254R)
21.    The DNA molecule of claim 18 wherein said sequence encodes a PAP II  
protein which is PAP II (1-285, L254A).
22.    The DNA molecule of claim 18 wherein said sequence encodes a PAP II  
20 protein which is PAP II (1-237).
23.    The DNA molecule of claim 18 wherein said sequence encodes a PAP II  
protein which is PAP II (1-259).
24.    The DNA molecule of claim 18 wherein said sequence encodes a PAP II  
protein selected from the group consisting of PAP II (1-237), PAP II (1-238), PAP II (1-239),  
25 PAP II (1-240), PAP II (1-241), PAP II (1-242), PAP II (1-243), PAP II (1-244), PAP II (1-245),  
PAP II (1-246), PAP II (1-247), PAP II (1-248), PAP II (1-249), PAP II (1-250), PAP II (1-251),  
PAP II (1-252), PAP II (1-253), PAP II (1-254), PAP II (1-255), PAP II (1-256), PAP II (1-257),  
PAP II (1-258) and PAP II (1-259).
25.    An isolated and purified mutant PAP II protein having intact catalytic  
30 active site amino acid residue (E172) and exhibits anti-viral and/or anti-fungal activity.
26.    The PAP II protein of claim 25 which is PAP II (1-285, G72D).
27.    The PAP II protein of claim 25 which is PAP II (1-285, L254R)
28.    The PAP II protein of claim 25 which is PAP II (1-285, L254A).
29.    The PAP II protein of claim 25 which is PAP II (1-237).
- 35               30.    The PAP II protein of claim 25 which is PAP II (1-259).

- 5           31.    The PAP II protein of claim 25 which is selected from the group consisting of PAP II (1-237), PAP II (1-238), PAP II (1-239), PAP II (1-240), PAP II (1-241), PAP II (1-242), PAP II (1-243), PAP II (1-244), PAP II (1-245), PAP II (1-246), PAP II (1-247), PAP II (1-248), PAP II (1-249), PAP II (1-250), PAP II (1-251), PAP II (1-252), PAP II (1-253), PAP II (1-254), PAP II (1-255), PAP II (1-256), PAP II (1-257), PAP II (1-258) and PAP II (1-  
10   259).
32.    A vector comprising the DNA molecule of claim 25.
33.    A method of making a plant that has increased resistance to viruses and/or fungi, comprising preparing a transgenic plant that expresses a DNA molecule comprising a sequence encoding a PAP II protein.
- 15           34.    The method of claim 33 comprising stably transforming a protoplast with the DNA molecule, and regenerating the transgenic plant from the transformed protoplast.
35.    The method of claim 33 comprising introducing the DNA molecule into a plant part, and regenerating the transgenic plant from the plant part containing the DNA molecule.
- 20           36.    A method of identifying a PAP II protein having reduced cytotoxicity, comprising:
- (a)    providing a eukaryotic cell stably transformed with a DNA molecule comprising a sequence encoding a PAP II protein, operably linked to an inducible promoter functional in said eukaryotic cell;
- 25                   (b)    culturing the transformed cell in medium;
- (c)    adding an inducer to said medium; and
- (d)    determining extent of growth of the cultured cell.
37.    The method of claim 36 wherein said eukaryotic cell is a yeast cell.